REMARKS

Applicant has carefully studied the outstanding Office Action. The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Applicant expresses appreciation to Examiner Nathan W. Schlientz for the courtesy of interviews, which were granted to Applicant and Applicant's representative, Sanford T. Colb (Reg. No. 26,856). The interviews were held in the USPTO on April 29, 2010 and June 8, 2010. The substance of the interviews is set forth in the Interview Summaries.

At the interview on April 29, 2010, the patentability of the claims vis-à-vis the cited prior art and the additional art of Burrows et al., "The equilibrium between ammonium carbonate and ammonium carbamate in aqueous solutions at 25°", JACS 34 (8): 993, 1912 (hereinafter "Burrows"), which was cited at the interview by the Examiner, was discussed. The Interview Summary states, in relevant part, "Inventor Barak explained that one of ordinary skill in the art cannot assume that all ammonium salts behave the same with respect to their invention. The present application has shown that a nitrogen-containing compound with a nitrogen in both the anionic and cationic portion of the compound exhibits enhanced activity when mixed with hypochlorite oxidants, as opposed to nitrogen-containing compounds wherein a nitrogen is

only found in the cationic group. The Examiner then discussed Burrows wherein it is taught that ammonium carbonate and ammonium carbamate rapidly transform into one another under ordinary conditions (pg. 993 second paragraph)."

At the interview on June 8, 2010, the patentability of the claims vis-à-vis the cited prior art and in particular Burrows, Fenton, "On the limited hydration of ammonium carbamate", Proc. Roy. Soc. London, 39, 386, 1885 (hereinafter "Fenton"), referenced by Burrows, and Wen and Brooker, J. Phys. Chem., 99, 359, 1995, (hereinafter "Wen"), which was brought to the Examiner's attention by Applicant, was discussed. The Interview Summary states, in relevant part, "Particularly, Dr. Ayala explained that at a high pH, such as the pH conditions for the instant invention, there is not an equilibrium between ammonium carbonate and ammonium carbamate. This is further evidenced by the examples of the instant invention wherein ammonium carbonate and ammonium carbamate did not result in the same biocidal efficacy under the inventive conditions. Applicants arguments and the evidence appear to support the fact that under the inventive conditions, ammonium carbonate and ammonium carbamate will not exist in equilibrium. Applicants agreed to amend the claims to recite a pH of at least 8.0, with dependent claims further limiting the pH to at least 9.5, at least 10.0, at least 10.5, at least 11.0 and at least 11.5, in order to further clarify that the inventive conditions have a high pH."

The Application as examined included claims 95, 97, 99 – 103, 105 – 119, 122 – 125 and 127 - 133. Claims 1 – 94, 96, 98, 104, 120 – 121 and 126 have been cancelled. Claims 109, 110, 112 – 119, 125, 127 and 128 have been withdrawn.

In the present response, claims 95, 125 and 129 are amended, and new claims 134 – 137 are added.

Claims 95, 97, 99 – 103, 105 – 108, 111, 122 – 124 and 129 - 133 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Barak (U.S. Patent No. 5,976,386, hereinafter Barak '386) or Barak (US Patent No. 6,132,628, hereinafter Barak '628) in view of Watanabe (U.S. Patent No. 4,476,930, hereinafter Watanabe). Applicant notes that Barak '628 is a direct continuation of Barak '386 and that the specifications of Barak '628 and Barak '386 are identical. In view of the foregoing, arguments presented to overcome rejections based on Barak '386 also apply to rejections based on Barak '628.

Claims 95, 125 and 129 are amended to include the limitation that the pH of the biocide is between 9.0 and 11.5. Support for this amendment can be found in original claim 42. New claims 134 – 137 depend from claim 95, and are supported by original claims 43 – 46.

With respect to Burrows et al. which is cited by the Examiner in the first Interview Summary, applicant respectfully responds as follows:
Burrows discloses a method of selectively precipitating carbonate from a mixed solution of carbonate and carbamate using barium. Burrows states that it is well

known that upon adding barium or calcium salts to a solution of ammonium carbamate, "on standing for a short time, and, if kept neutral or slightly alkaline, precipitation as carbonate is soon completed" (pg. 993, third paragraph). Burrows teaches that conversion of ammonium carbamate to ammonium carbonate takes place in a neutral or slightly alkaline solution. Fenton discloses that ammonium carbamate in the presence of sodium hypochlorite and a strong base (sodium hydroxide) does not convert to carbonate.

Wen also studied the equilibrium between carbonate and carbamate. They found that "an unbuffered aqueous equimolar mixture of sodium carbonate and ammonia was found to be almost 100% carbonate with no detectable carbamate" (page 366, second paragraph). An equimolar mixture of sodium carbonate and ammonia is strongly basic (pH ~ 11 as calculated from mass and charge balance). Accordingly, Wen shows that under basic conditions, there is no conversion from carbonate to carbamate.

In Example 9 of the present application, it is shown that before ammonium carbamate is mixed with sodium hypochlorite in order to prepare a biocide, HCl is added to the ammonium carbamate solution in order to ensure biocide preparation at a pH of 9.2. It can be seen, therefore, that without the addition of acid, the biocide would have been prepared at a pH higher than 9.2. Since Burrows and Wen teach that at high pH no conversion between carbamate and carbonate takes place, it can be concluded that in the biocides of the present invention, there is no conversion from carbamate to carbonate.

The above conclusion, that there is no conversion between ammonium carbamate and ammonium carbonate under conditions of the present invention is supported by the results of the direct comparison between biocides prepared from these two ammonium salts in Example 7 of the present application. This Example clearly demonstrates that biocides prepared from ammonium carbamate are superior to biocides prepared from ammonium carbonate at killing aerobic and anaerobic bacteria, at least at biocide concentrations between 1.4 and 8.4 ppm, as also stated by the Examiner at page 8, second paragraph, of the Office Action.

This result is completely unexpected in view of Burrows alone since if ammonium carbamate transforms into ammonium carbonate, as suggested by Burrows, then biocides prepared from ammonium carbamate or from ammonium carbonate would be expected to be have the same efficacy in killing microorganisms. In the Summary of the Interview of June 8, 2010, the Examiner acknowledged that under the inventive conditions, ammonium carbamate and ammonium carbonate do not exist in equilibrium.

In view of the foregoing, since under conditions of the present application ammonium carbamate does not transform into ammonium carbonate and since biocides prepared from ammonium carbamate are indeed unexpectedly superior to biocides prepared from ammonium carbonate, Burrows et al. does not render the present claims obvious.

In the Office Action, the Examiner states that based on the disclosure in Watanabe, the ammonium salts disclosed therein, including ammonium nitrate, ammonium sulfate, ammonium sulfamate, ammonium carbonate and ammonium carbamate are functionally equivalent to one another and therefore it would have been prima facie obvious for one of ordinary skill in the art at the time of the invention to select ammonium carbamate or ammonium sulfamate as the amine source in the composition of Barak '386 or of Barak '628, thus arriving at the claimed invention.

Applicant respectfully disagrees with the Examiner's assertion for the reasons outlined below.

Column 6 lines 22 – 31 of Watanabe discloses a list of compounds which provide a nitrogen containing cation and, according to column 5, lines 46 – 56 of Watanabe are therefore capable of disassociating in flashing into ammonia and acid thereby causing a decrease in alkalinity.

However, the above-mentioned list includes, inter alia, quaternary ammonium salts. A person skilled in the art would know that quaternary ammonium salts cannot be chlorinated and are therefore not suitable for use in the methods of US Barak '386. It follows that at least quaternary ammonium salts are not functionally equivalent to ammonium salts disclosed Barak '386.

Additionally, the present application shows a significant difference in the effect on the pH of the treated medium between different ammonium salts. For example, Table 9B on page 57 clearly demonstrates that a biocide derived

from ammonium carbamate (designated with numeral 17) maintains the pH of the treated medium at 8.7-8.8 after three days, while in the presence of a biocide derived from a mixture of glycine and ammonium hydroxide (designated with numeral 13 and representing an ammonium salt of an organic acid) the pH of the treated medium dropped to 7.3-7.4 after three days. Based on Watanabe, both ammonium salts would have been expected to have the same effect on the pH of the treated medium.

According to results shown in Tables 9B, 10, 11, 14 and 15 of the present application, a decrease in pH corresponds to lack of control of bacterial population by the added biocide while maintenance of a high pH corresponds to effective control. The results presented above are unexpected in view of Watanabe, since these results demonstrate that different ammonium salts are not functionally equivalent.

In view of the foregoing, a person skilled in the art would have no reason to assume that any ammonium salt disclosed in Watanabe, such as ammonium carbamate and ammonium sulfamate, can be used in the methods disclosed in Barak '386 and Barak '628 to arrive at the present invention. Therefore, Barak '386 and Barak '628 in view of Watanabe do not render the present application obvious.

The Examiner has provisionally rejected claims 95, 97, 99 – 103, 105 – 108, 111, 122 – 124 and 130 – 133 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 384, 387,

388, 390, 391, 395 – 398, 401, 403 – 410, 417, 418 and 420 of copending Application No. 11/056,405 in view of US 5,976,386. A terminal disclaimer over US Application No. 11/056,405 is submitted herewith in order to overcome this rejection.

The Examiner has rejected claims 95, 97, 99 – 103, 105 – 108, 111, 122 – 124 and 129 – 133 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 – 22 of US 5,976,386 and over claims 1 – 23 of US 6,132,628. The Examiner states that the conflicting claims are not identical and specifically, that the claims of '386 and of '628 do not recite ammonium carbamate as the ammonium salt. However, based on Watanabe the Examiner asserts that ammonium salts including ammonium nitrate, ammonium sulfate, ammonium sulfamate, ammonium carbonate and ammonium carbamate are functionally equivalent, and therefore it would have been prima facie obvious for one of ordinary skill in the art to use ammonium carbamate as the ammonium salt in '386 or in '628.

Applicant presented arguments above demonstrating that ammonium salts disclosed in Watanabe are not all functionally equivalent. Furthermore, applicant also presented arguments above demonstrating specifically that ammonium carbamate and ammonium carbonate, which are disclosed in Burrows et al., are not functionally equivalent. Therefore, it would not have been obvious for a person skilled in the art to use ammonium carbamate as the ammonium salt in Barak '386 or in Barak '628, and, as a result,

the claims of the present application are patentably distinct from the claims of Barak '386 and the claims of Barak '628.

In view of the foregoing remarks, all of the claims are believed to be in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Respectfully submitted,

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